Travel Through Smoke

Problem Booklet

Mining Systems and Human Engineering
U. S. Bureau of Mines
Pittsburgh, Pennsylvania

Instructions

Read the problem described on the next page. Next, answer each of the 10 questions. Do them one at a time. Don't jump ahead, but you may look back to earlier questions and answers. Some questions direct you to select all of the answers that you think are correct. Other questions ask you to choose only one answer unless you are told to "Try again!" Follow the directions for each question.

After you have selected your choice to a question, look up its number on the answer sheet. Select your answer(s) to each question by rubbing the developing pen between the brackets on the answer sheet. A hidden message will appear and tell you if you are right and may give you additional information. When you have finished you will learn how to score your performance.

Background

You are a floating boss and today you are the section foreman on 4 North, a longwall development section. Before taking a management position, you were a fire boss for five years.

The coal seam is 72 inches.

This is a 4 entry section that has been driven 4,000 ft from the mains.

The 42 inch section belt is located in #1 entry. Belt air moves inby from the dumping point to the tailpiece.

The belt has a CO monitoring system and a fire alarm system. The fire alarm alerts only the section crew. The CO monitor alerts both the section crew and the dispatcher.

Including yourself, there are 8 persons working on this section.

SCSRs are stored both at the power center (10) and on the mantrip (12). You do not have a hand held CO detector.

The fire barrel at the power center contains a hand axe, a hose nozzle, and 500 ft of fire hose.

A 100 ft length of rope is kept at the SCSR cache at the power center. The primary escapeway is the #3 entry, which is the main intake entry. The alternate escapeway is the #2 track entry.

The mine uses battery rail haulage for moving supplies and personnel. Communications is by radio, or "haulage talkie".

At this mine mandoors are located at every fifth crosscut when possible.

Problem

The CO monitor has gone off three times in the last hour. Each time the alarm went off you alerted your crew, sent someone to visually check the belt, and called the dispatcher. Your investigation found no smoke or fire. There have been problems with the CO monitoring system giving false alarms.

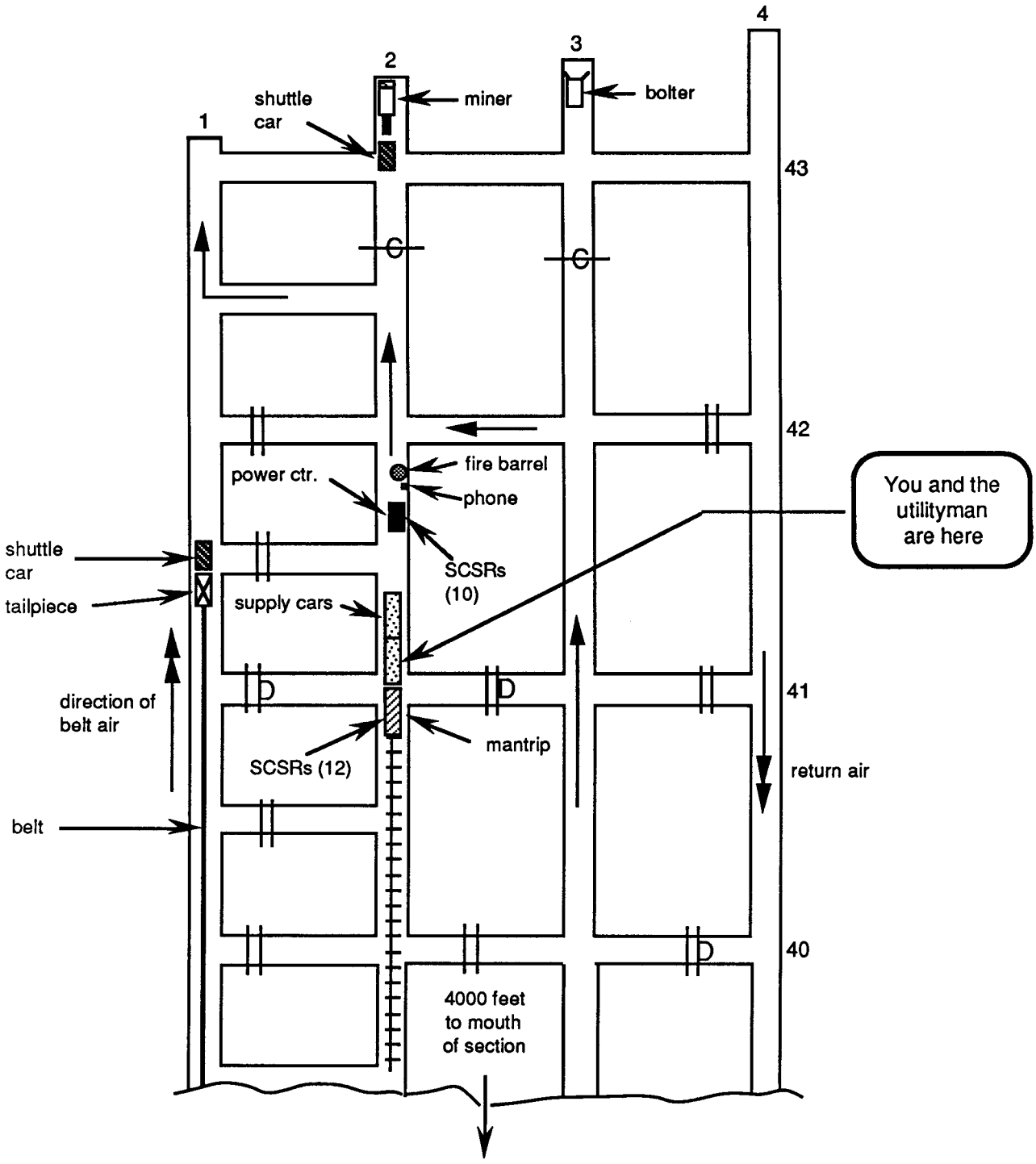

Figure 1: Section map for 4 North (not to scale)

Question A

You and the section utility man are checking materials at the supply car in entry #2. (See Figure 1.) You get a strong smell of smoke. What should you do? (Select as MANY as you think are correct.)

1. Send the section utility man to the face to alert the crew that there might be a problem and return to the power center, while you go to the phone to call the dispatcher.

2. Send the section utility man to the face to alert the crew that there might be a problem and return to the power center, while you take the portal bus and travel outby to try to locate the source of the smoke.

3. Take a quick look around for the source of the smoke.

4. Send the section utility man to call the dispatcher while you go to the face to alert the crew.

When you have made your selection(s), do the next question.

Question B

The utility man has gone to the face to alert the rest of the crew and has returned. You are talking to the dispatcher. He asks, "Is it your CO monitor again?" You say, "No, I smell smoke." What should you do now? (Select as MANY as you think are correct.)

5. Tell the dispatcher you are pulling the equipment out of the face and assembling the crew at the SCSR cache.

6. Tell the dispatcher you are sending the mechanic outby in the portal bus to check on the smoke while you stay by the phone and your crew assembles.

7. Ask the dispatcher if the section track is clear to the mainline.

8. Tell the dispatcher that you will monitor the situation closely to see if there is a problem, or wait until you hear from him or the shift foreman.

9. Ask the dispatcher to send someone to check out the situation.

When you have made your selection(s), do the next question.

Question C

While waiting for the dispatcher to have the situation checked, you see smoke rolling in like wisps of fog. You decide to knock the power and send the utility man to assemble the crew. While the crew is assembling at the power center, the smoke smells even stronger. What should you do now? (Choose only ONE unless you are told to "Try again!")

10. Make a head count.

11. Tell the dispatcher you and the crew will wait by the phone until he calls you with more information.

12. Send two miners to the face to hang a line curtain in #2 entry to prevent methane accumulation because the auxiliary fan has been de-energized.

13. Take a miner with you to check the air in #3 entry (your intake or primary escapeway), and, if the air is clean, place a check curtain just outby crosscut #42.

14. Have everyone put on their filter self-rescuer (FSR) right now and wear it until you get into heavier smoke.

Question D

The smoke appears to be slightly heavier in the track entry and is beginning to smell like coal. Visibility is about 200 feet. The utility man says that there is also smoke in the #3 entry. It is time to leave. You still haven't heard from the dispatcher. What actions should you take as you prepare to depart the power center with your crew? (Select as MANY as you think are correct.)

15. Assign a miner to get the 100 ft length of rope from the SCSR cache and the hand axe from the fire barrel.

16. Get the hose nozzle and the 500 ft of fire hose from the fire barrel to take with you.

17. Tell everyone to bring an SCSR from the portal bus so that each person will have one in addition to those at the cache. Tell them you will don the SCSRs on your way out.

18. Tell everyone to don an SCSR from the cache and check each other to make sure the devices are working and that they are donned correctly.

19. Call the dispatcher and tell him you are preparing to leave the section.

20. Make a note of the time.

When you have made your selection(s), do the next question.

Question E

While the crew is donning and checking their SCSRs, you make another call to the dispatcher because he hasn't called you. What should you communicate at this time? (Select as MANY as you think are correct.)

21. Tell the dispatcher that you and the crew are walking out the #3 entry, which is your primary escapeway.

22. Tell the dispatcher that you are coming out on the portal bus. Remind him that he must keep you updated without your having to call him for information.

23. Tell the dispatcher to keep the section track clear.

24. Tell the dispatcher that you will call him from the phone at the head drive when you get to the mouth of the section.

25. Tell the dispatcher that you have smoke in the track entry and in the primary escapeway. Advise him that you will move into the primary escapeway if the smoke becomes too heavy in the track.

When you have made your selection(s), do the next question.

Question F

You and your crew are now on the portal bus and have traveled outby 15 crosscuts. You noted the time when you started out. It was 10:35 P.M. It is now 10:40 P.M. Everyone is breathing with their SCSR. The smoke has become so thick that visibility is now about 100 ft. What should you do now? (Select as MANY as you think are correct.)

26. As you travel, count the number of crosscuts so you always know where the nearest mandoor is.

27. Stop the mantrip. Check the air in the primary escapeway (#3 entry) for smoke. If there is no smoke, you and your crew can walk out in fresh air.

28. Signal the operator to increase the speed of the portal bus so you can get out faster, before the smoke gets worse.

29 Signal the operator to reduce speed and proceed cautiously.

30. Talk to your crew to reassure them and explain what you are doing.

31. Take a deep breath on your SCSR, remove the mouthpiece and call the dispatcher on the haulage talkie to report your location, the smoke, that you are coming out slowly on the bus, and to ask for information about the fire.

When you have made your selection(s), do the next question.

Question G

You and your crew stay on the portal bus and continue on slowly for 12 more crosscuts. You check your watch and see it is almost 10:50 P.M. You passed the last mandoor 2 crosscuts back. The visibility has dropped to between 50 and 60 feet and it has begun to get difficult to see the stoppings in the crosscuts. The operator stops the bus, removes his mouthpiece and says, "I don't think I'll be able to see to go much further." What should you do now? (Select as MANY as you think are correct.)

32. Signal the operator to stop the bus. It is now time to start walking the track.

33. Signal the operator to continue, but go very slowly. You want to go as far as the next mandoor.

34. Signal the operator to put his mouthpiece back in and stop talking.

35. Signal the operator to tram the bus back to the last mandoor so that you and your crew can get into the primary escapeway in the #3 entry.

When you have made your selection(s), do the next question.

Question H

The visibility is continuing to get worse and you haven't heard from the dispatcher anymore. You travel 3 more crosscuts, look into the crosscut and barely see the mandoor. What should you do now? (Choose only ONE unless you are told to "Try again!")

36. Signal the operator to continue on slowly since you are waiting to hear from the dispatcher.

37. Signal the operator to stop the bus. Then, signal your crew to get off the bus and follow you through the mandoor.

38. Signal the operator to stop the bus. Get off the bus and tie one end of the 100 ft rope to yourself and the other end to a miner on the bus. While he remains on the bus holding the rope, take an extra SCSR with you and locate the mandoor. Open the door and check the #3 entry.

39. Signal the operator to stop the bus. Send a miner to locate the mandoor and then have the rest of the crew follow him while you call the dispatcher and tell him that you are going to move into the primary escapeway in the #3 entry.

Question I

You come back to the bus and motion for everyone to grab an extra SCSR. You then signal your crew to follow you and the rope into entry #3. The last miner brings the rope with him. Visibility in entry #3 is about 300 ft. What should you do now? (Select as MANY as you think are correct.)

40. Make a head count and check the time.

41. Select your most fit miner, give him an extra SCSR, and tell him to travel ahead and check out the escape route and mine conditions.

42. You, as a section foreman and former fireboss, have extensive knowledge of the mine. You place a miner who also knows the mine, the escape route, and escape procedures at the inby end of the rope while you take the lead at the head of the rope.

43. When you start to move the group out, set a fast but steady pace in order to minimize the time for your escape.

44. Signal each miner to grab the rope at equally spaced intervals.

45. When you start to move the group out, set a moderate and steady pace as you escape from the section.

When you have made your selection(s), do the next question.

Question J

After moving into the #3 entry, you and your crew travel about 1100 feet along the primary escapeway at which point you hit clear air. You know that you have reached the mains and that there is a mandoor nearby that leads to the track. You check the time and note that it is just after 11:00 P.M. What should you do now? (Choose only ONE unless you are told to "Try again!")

46. Take your SCSR off and tell the crew to do the same since many are having trouble breathing and the air is clear.

47. While your crew rests for a few minutes, send a miner who knows the escapeway to locate the mandoor that leads to the track.

48. Signal your crew to keep their SCSR mouthpieces in and to follow you as you lead them to the mandoor.

49. Tell the crew to rest while you go to call the dispatcher to see if he knows anything else about the fire.

You locate the mandoor leading to the track and feel it to see if it is warm. It feels cool to the touch. You open the door and find that the air is clear. You and your crew go through the door and come out into clear air in the track entry of the mains. Several mantrips are there waiting to take you and your crew out of the mine. Upon reaching safety, you learn that a belt mechanic's jeep is on fire in the first spur off 4 North track.

An investigation following the fire revealed that the mechanic parked the jeep in this spur while he was inspecting and lubricating the 4 North belt drive. Expecting to be at the belt drive only a few minutes, he did not knock the main power breaker. He accidentally left the controller in first point. As a result, the tram motor overheated and caused a fire.

END OF PROBLEM

Scoring your performance

1. Count the total number of responses you colored in that were marked "Correct". Write this number on the first line on the answer sheet.

2. Count the total number of incorrect responses you colored in. Subtract this number from 27. Write the difference in the second line on the answer sheet.

3. Add the numbers on lines one and two.

4. The best score is 49. The worst score is 0.